WHAT IS CLAIMED IS:

1. A defect inspection apparatus comprising:

a mount for mounting a specimen;

an illumination light to illuminate the specimen;

an imaging optical system forming an image of the specimen, the imaging optical system including an objective lens with a numerical aperture providing a resolution of at least 0.18 microns, when combined with the illumination light;

an opto-electrical converter positioned to detect the image of the specimen;

an auto-focus optical system including an illumination module and a detection module, the illumination module providing illumination on a surface of the specimen at an incident angle of at least 85 degrees relative to a normal of a surface of the specimen, the detecting module detecting light from the illumination module and reflected by the specimen;

an adjuster for adjusting a focal position of the imaging optical system based on a detection signal received from the auto-focus optical system; and

a detector which detects defects on the specimen by processing electronic signals from the opto-electrical converter.

2. Apparatus in claim 1 further comprising:

a temperature detector to measure temperature of the imaging optical system; and

a controller to control the adjuster using temperature information detected by the temperature detector.

3. Apparatus in claim 2 wherein the temperature detector measures a temperature at or near the objective lens of the imaging optical system.

4. Apparatus in claim 2 wherein the controller predicts a focal position offset based on temperature information detected by the temperature detector and a previously estimated relationship between temperature and focal position offset and uses the predicted focal position offset to control the adjuster based on the prediction.

5. A defect inspection apparatus comprising:

means for mounting a specimen;

means for illuminating the specimen;

an imaging optical system forming an optical image of said illuminated specimen;

means for opto-electrical conversion detecting an optical image of said specimen formed by said imaging optical system;

an auto-focus optical system diagonally illuminating a surface of said specimen and detecting light reflected from said specimen;

means for measuring temperature of said imaging optical system;

means for adjusting a focal position of said imaging optical system based on a detection signal from said auto-focus optical system and information about a temperature of said imaging optical system measured by said temperature measuring means;

means for detecting defects on said specimen by processing electronic signals output from said opto-electrical converting means; and

means for displaying, on a screen, information relating to defects of said specimen detected by said defect detecting means.

6. A defect inspection apparatus as in claim 5 wherein said imaging optical system includes an objective lens with a numerical aperture providing a resolution of at least 0.18 microns, when combined with said illumination light from said illuminating means.

7. A defect inspection apparatus as in claim 5 wherein said auto-focus optical system provides illumination on a surface of said specimen mounted on said mounting means at an incident angle of at least 85 degrees relative to a normal of said specimen surface.

8. A method for inspecting defects comprising the following steps:

illuminating a surface of a specimen at an angle relative to said surface;

detecting light from said illumination reflected by said specimen;

determining, based on a signal obtained by detecting light reflected from said specimen, a focal position of an imaging optical system used to form an optical image of a surface of said substrate;

matching a height position of said specimen with said determined focal position;

illuminating said specimen at said matched height;

forming an optical image of said specimen using said imaging optical system equipped with an objective lens with a numerical aperture providing a resolution of at least 0.18 microns, when combined with said illumination light from said illuminating means;

capturing an optical image of said specimen; and

processing a signal obtained by capturing said optical image of said specimen and detecting defects of said specimen.

9. A method for inspecting defects on a specimen as in claim 9 further comprising the following steps:

measuring a temperature of said imaging optical system; and

determining a focal position of said imaging optical system using said measured imaging optical system temperature information.

10. A method for inspecting defects on a specimen as in claim 8 wherein temperature at or near said objective lens of said imaging optical system is measured.

11. A method for inspecting defects on a specimen as in claim 8 wherein:

a focal position offset is predicted based on temperature information detected by said temperature detecting means and previously determined relationship between temperature and focal position offset; and

a focal position of said imaging optical system is controlled based on said prediction.

12. A method for inspecting defects comprising the following steps:

illuminating a surface of a specimen at an angle relative to said surface;

detecting light from said illumination reflected by said specimen;

measuring a temperature of an imaging optical system which has an objective lens;

detecting light reflected from said surface of said specimen and determining, based on an obtained signal and said measured temperature information, a focal position of an imaging optical system;

matching a height of said specimen with said determined focal position;

illuminating said specimen at said matched height;

forming an optical image of said specimen illuminated by said illumination light using said imaging optical system;

capturing an optical image of said specimen; and

processing a signal obtained by capturing said optical image of said specimen and detecting defects of said specimen.

13. A method for inspecting defects as in claim 12 wherein a temperature of said objective lens is measured in said step for measuring a temperature of said imaging optical system.

14. A method for inspecting defects as in claim 12 wherein said objective lens has a numerical aperture providing a resolution of at least 0.18 microns, when combined with said illumination light from said illuminating means, and said optical image is formed via said objective lens.

15. A method for inspecting defects as in claim 12 wherein said light illuminating said surface of said specimen at an angle relative to said surface is illuminated with an incident angle of at least 85 degrees relative to a normal of said specimen surface.